NASA Procedural Requirements

NPR 7123.1B
Effective Date: April 18, 2013
Expiration Date: April 18, 2018

COMPLIANCE IS MANDATORY

Printable Format (PDF)

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Subject: NASA Systems Engineering Processes and Requirements

Responsible Office: Office of the Chief Engineer

Chapter 2. Institutional and Programmatic Requirements

2.1 Roles and Responsibilities

2.1.1 General

The roles and responsibilities of senior management are defined in part in NPD 1000.0, NASA Governance and Strategic Management Handbook, and NPD 7120.4, NASA Engineering and Program/Project Management Policy. NPR 7120.5, NASA Space Flight Program and Project Management Requirements; NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements; NPR 7120.8, NASA Research and Technology Program and Project Management Requirements; and other NASA directives define the responsibilities of program and project managers. This NPR establishes systems engineering processes and responsibilities.

2.1.1.1 For programs and projects involving more than one Center, the lead organization will develop documentation for DGA approval to describe the hierarchy and reconciliation of Center plans implementing this NPR. The governing Mission Directorate or mission support office determines whether a Center executes a project in a lead role or in a supporting role. For Centers in supporting roles, compliance should be jointly negotiated and documented in the lead Center's project SEMP.

2.1.1.2 The roles and responsibilities associated with program and project management and Technical Authority (TA) are defined in the Program and Project Management NPRs (for example, NPR 7120.5 for space flight projects). Specific roles and responsibilities of the program/project manager and the engineering technical authority related to the SEMP are defined in Paragraphs 2.1.6 and 6.2.

2.1.2 Office of the Chief Engineer (OCE)

2.1.2.1 The OCE, under the authority of NPD 7120.4, will ensure compliance with this SE NPR.

2.1.2.2 The OCE will ensure systems engineering policies' compatibility across NASA.

2.1.3 Mission Directorate or Headquarters Program Offices

2.1.3.1 When programs and projects are managed at Headquarters or within Mission Directorates, that Program Office is responsible for the requirements in this NPR that are assigned to the Center Director. Technical teams residing at Headquarters will follow the requirements of this NPR unless specific process requirements have been established to implement this NPR by the governing organization. The technical teams residing at Centers will follow Center level process requirement documents.

2.1.4 Center Directors

2.1.4.1 In this document, the phrase "the Center Directors shall..." means the roles and responsibilities of the Center Directors may be further delegated within the organization to the scope and scale of the system.

2.1.4.2 The Center Director is responsible and accountable for both Institutional Authority responsibilities and the proper planning and execution of programs and projects assigned to the Center.

2.1.4.3 Center Directors shall perform the following activities:

a. Establish policies, procedures, and processes to execute the requirements of this SE NPR [SE-01].

b. Assess and take corrective actions to improve the execution of the requirements of this SE NPR [SE-02].

c. Select appropriate standards applicable to projects under their control [SE-03].

d. Complete the compliance matrix, as tailored, in Appendix H.1 for those requirements owned by the Office of Chief Engineer, and provide to the OCE upon request [SE-04].

2.1.5 Technical Teams

2.1.5.1 Each technical team executes the Center processes to implement this SE NPR under the oversight of the Center Directors in accordance with the SEMP. The makeup and organization of each technical team is the responsibility of each Center or program and includes the personnel required to implement the project.

2.1.5.2 For those requirements owned by Center Directors, the technical team shall complete the compliance matrix in Appendix H.2 and include it in the SEMP [SE-05].

2.1.5.3 For systems that contain software, the technical team ensures that software developed within NASA or acquired complies with NPR 7150.2, NASA Software Engineering Requirements.

Note 1: NPR 7150.2 elaborates on the requirements in this document and determines the applicability of requirements based on the Agency's software classification. Note 2: NPD 7120.4 contains additional Agency requirements for the acquisition, development, maintenance, and management of software.

2.1.6 Designated Governing Authority

The Designated Governing Authority (DGA) for the technical effort in this SE NPR is the Center Director or the person that has been designated by the Center Director to ensure the appropriate level of technical management oversight. Such designation is made from the technical line so that independence between programmatic and technical authority is maintained. The DGA works with the Program/Project Manager to manage the technical effort. The DGA is assigned primary responsibility for evaluating the technical content of a particular program or project to ensure that it is meeting the commitments specified in the key technical management documents. The DGA shall approve the SEMP, waiver authorizations, and other key technical documents to ensure independent assessment of technical content [SE-06]. The DGA and the program/project manager approve the SEMP.

Note 1: For large programs/projects, the DGA will typically be the associated independently funded Engineering Technical Authority (ETA). In the case of very small projects, DGA responsibilities are occasionally delegated to line managers or other technical experts who are not independently funded and do not serve in an official ETA capacity. If the DGA is not a recognized ETA, an ETA at the appropriate level will be required to approve the SEMP to ensure compliance with the Agency's technical authority process. Note 2: For NPR 7120.7 projects affecting more than one Center, the NASA Chief Information Officer (CIO) or the person the NASA CIO designates is the DGA.

2.2 Tailoring and Customization

2.2.1 Tailoring SE Requirements

2.2.1.1 SE requirements tailoring is the process used to seek relief from SE NPR requirements consistent with program or project objectives, acceptable risk, and constraints.

2.2.1.2 The tailoring process (which can occur at any time in the program or project's life cycle) results in deviations or waivers to requirements depending on the timing of the request. Deviations and waivers of the requirements in this NPR can be submitted separately to the requirements owner or via the appropriate compliance matrix in Appendix H.

2.2.1.3 The results of a Center's tailoring of NPR 7123.1 SE requirements will be documented in the Compliance Matrix for Centers (Appendix H.1) and submitted to OCE upon request or as changes to the Center processes occur.

2.2.1.4 The results of the program/project Technical Team tailoring of SE requirements from either NPR 7123.1 or a

particular Center's implementation of NPR 7123.1, whichever is applicable, will be documented in the next revision of the SEMP, along with supporting rationale and documented approvals from the requirement owner.

2.2.1.5 The appropriate requirement owner, as described in the compliance matrices (Appendix H) will have responsibility to approve or disapprove any SE NPR requirement that is tailored.

2.2.2 Customization of SE Practices

2.2.2.1 Customization is the modification of recommended SE practices that are used to accomplish the SE requirements. Examples of these practices are in Appendix C or in NASA/SP-2007-6105.

2.2.2.2 Technical teams are encouraged to customize their non-requirement SE practices. The results of this customization do not require waivers or deviations, but significant customization should be documented in the SEMP.

2.2.3 Considerations for Tailoring or Customization

2.2.3.1 Considerations for tailoring or customization should include: scope and visibility (e.g., organizations and partnerships involved, international agreements); risk tolerance and failure consequences; system size; system complexity (e.g., human spaceflight vs. flagship science vs. subscale technology demonstration, number of stages and interfaces, technology readiness level); impact on other systems; longevity; serviceability (including on-orbit); constraints (including cost, schedule, degree of insight/oversight permitted with partnerships or international agreements, etc.); safety; technology base; and industrial base.

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